REMARKS

This is in response to the Office Action of October 17, 2007. The feature of claim 2 is incorporated into claim 1, and claim 2 is accordingly cancelled, without prejudice. The feature of claim 8 is incorporated into claim 7, and claim 8 is accordingly cancelled, without prejudice. The feature of claim 14 is incorporated into claim 13, and claim 14 is accordingly cancelled, without prejudice. The feature of claim 20 is incorporated into claim 19, and claim 20 is accordingly cancelled, without prejudice. No new matter is added to the application by this Amendment. Claims 1, 3-7, 9-13, 15-19, and 21-26 are pending in the application.

Claim rejections - 35 USC § 112, ¶¶ 1 & 2

On pages 2-3 of the Office Action, the Examiner rejects claims 1, 7, 13, and 19 due to their recitation of the clause "said organic layer has a glass transition temperature of from 40°C to a temperature 40°C higher than the flow-starting temperature." It is noted that the specification teaches, in the paragraph bridging pages 30-31, that "glass transition temperatures of the organic layer ... are preferably from 40°C to the transfer temperature + 40°C." Claims 1, 7, 13, and 19 are amended based upon that disclosure. This proposed amendment is in agreement with the Examiner's interpretation of the claims as set forth in item 4. on page 3 of the Office Action.

On pages 3-4 of the Office Action, the Examiner questions whether the second substrate electrode recited in claims 2, 3, 8, 9, 14, 15, 20, and 21 is the same as or different from the first substrate electrode recited in claims 1, 7, 13, and 19. Claims 2, 3, 8, 9, 14, 15, 20, and 21 have been amended to clarify that issue.

On page 4 of the Office Action, claims 25 and 26 are rejected as being incomplete. It is respectfully submitted that, as amend herein, claims 25 and 26 obviate that rejection.

In view of the above amendments and remarks, each of claims 1, 3-7, 9-13, 15-19, and 21-26 in its present form is believed to be in full compliance with the requirements of the first and second paragraphs of 35 USC § 112.

Rejections over Tateishi et al. reference

Claims 1, 2, 4-8, 10-14, 16-20, and 22-26 are rejected over US 2003/0221763 A1 ("Tateishi") in view of the previously cited article in *Appl. Phys. Lett. 1998* ("Zhang") on pages 5-6 of the Office Action. Claims 3, 9, 15, and 21 are rejected over Tateishi in view of Zhang and US 6,188,176 B1 ("Nakaya"). Office Action, pages 9-10. The Tateishi et al. application was published on 4 December 2003 and is based on an application filed in the U.S. on 27 May 2003. The present application was filed in the U.S. on 30 March 2004 and claims priority to application JP 2003-097329, filed in Japan on 31 March 2003. Accordingly, the Tateishi et al. application can be removed as a reference against the present application by perfection of Applicant's claim for benefit of the priority date of JP 2003-097329. A certified copy of the priority application is already of record in the present U.S. patent application. Enclosed herewith is a translation of the certified copy of the priority application into the English language, accompanied by a statement from the translator that the translation is accurate. It is respectfully submitted that this overcomes all rejections based on Tateishi.

Rejections over Tutt reference

Claims 1, 7, 13, 19, 25, and 26 are rejected as being unpatentable over US 2004/0029039 A1 ("Tutt") in view of Nakaya and *Appl. Phys. Lett. 2006* ("Tsai"). Office Action, pages 6-7. Since this ground of rejection was not applied against claims 2, 8, 14, and 20 – and since the feature of claims 2, 8, 14, and 20 has been incorporated into claims 1, 7, 13, and 19, respectively – this ground of rejection does not apply to any claim presently under consideration.

Claims 2-6, 8-12, 14-18, and 20-24 are rejected as being unpatentable over Tutt, Nakaya, Tsai, and US 2004/0079937 A1 ("Miyazawa"). Office Action, pages 7-10. The rejection is respectfully traversed.

Independent claim 1

Features of amended independent claim 1 herein – directed to a method for producing an organic electroluminescent device by using a transfer material comprising at least one organic layer formed on a support – are found in the steps of: **(1)** superposing the transfer material on a

first substrate having a first electrode formed at least partially thereon such that the organic layer of the transfer material faces the electrode on the first substrate; **(2)** applying heat and/or pressure thereto to form a laminate; and **(3)** peeling the support from the laminate so that the organic layer is transferred onto the first substrate via the electrode. Particularly distinguished features of Applicant's invention are that **(4)** the first substrate has a maximum surface roughness Rmax in the range of 0% to 50% obtained from a ratio of a maximum surface roughness Rmax (nm) of the first substrate to the thickness (nm) of the organic layer, **(5)** the organic layer has a glass transition temperature of from 40°C to the transfer temperature + 40°C, and **(6)** after the transfer of the organic layer onto the first substrate via the first electrode, a second substrate having an electrode formed at least partially thereon is laminated to the organic layer on the first substrate. In this way, the organic layer can be easily formed on a substrate to produce a uniform organic electroluminescent device with a good lamination interface, which is useful for full-color display devices, backlights of liquid crystal display devices, illumination surface light sources, light source arrays of printers, etc. See page 86, lines 16-24 of Applicant's specification.

The Examiner contends in lines 3-12 of Paragraph 10 of the Office Action that:

> Tutt teaches a method of forming an organic electroluminescent device by using a transfer material comprising at least one organic layer, such as TBADN (para. 0136) formed on a support (Para. 0135), which is a plate having a pattern. The manner in which the claim is written does not limit the pattern of the plate, so any arbitrary shape meets the claim. The transfer material is superposed on a first substrate having an ITO electrode formed thereon, such as clean glass OLED substrate (Para. 0138) such that the organic layer of the transfer material faces the ITO electrode formed on the first substrate (Para. 0138; Fig. 2a, for example). Heat is applied through the application of a laser which forms a laminate (Para. 0141), such that the organic layer is transferred onto the first substrate via the electrode (Para. 0141, for example). The glass transition temperature of TBADN or any organic layer is a material property.

Tutt actually discloses a donor element **12**, where a donor support element **14** is first coated with a radiation-absorbing patterned layer **22** capable of absorbing radiation in a predetermined portion of the spectrum to produce heat, then with a host material layer **18**, and finally a dopant layer **20**, so that the donor support element **14** then comprises a non-transfer surface **32** and a dopant layer **20** comprises transfer surface **34**, the radiation-absorbing patterned layer **22** including radiation-absorbing material capable of absorbing radiation in a predetermined portion of the spectrum and producing heat. See paragraph [0116] and Fig. 1b of Tutt. Also, Tutt teaches the transfer of organic material **30** from donor element **12** to portions of substrate **38**,

which can be an OLED substrate, by a method of treatment with light such that donor element **12** has been prepared with radiation-absorbing material **22** in a patterned layer, donor element **12** is positioned in a transfer relationship with and spaced from substrate **38** by gap **54**, flash light **56** irradiates non-transfer surface **32**, heat **50** is produced when flash light **56** strikes radiation-absorbing material **22**, which heats organic material **30** in the immediate vicinity of radiation-absorbing material **22** in a patterned layer, only a portion of the light impinging on donor element **12** (i.e. that which impinges directly on radiation-absorbing material **22**) being converted to heat, whereby some or all of the heated portion of organic material **30** is sublimed, vaporized, or ablated and becomes transferred organic material **52** on receiving surface **46** of substrate **38** in a patterned transfer, and this process can be effected in such a way that provides a reduced pressure atmosphere in gap **54** between donor element **12** and substrate **38**. See paragraphs [0120] and [0121] with Fig. 2b of Tutt.

It is clear, therefore, that Tutt fails to teach or suggest the feature **(3)** and the distinguishing characteristics **(4)** to **(6)** of amended claim 1 of the present application.

<u>Independent claim 7</u>

Features of the amended independent claim 7 directed to a method for producing an organic electroluminescent device by using a transfer material comprising at least one organic layer formed on a plate having a pattern are also found in the same steps **(1)** to **(6)** as in the amended claim 1 mentioned above. Accordingly, Tutt fails to teach or suggest the feature **(3)** and the distinguished features **(4)** to **(6)** of the amended claim 7 of the present application for the same reasons as described in the amended independent claim 1 above.

<u>Independent claim 13</u>

Features of the amended independent claim 13 directed to an organic electroluminescent device are found in being produced by a method comprising the steps of **(1')** superposing a transfer material comprising at least one organic layer formed on a support on a first substrate having a first electrode formed at least partially thereon such that the organic layer of the transfer material faces the electrode on the first substrate; **(2)** applying heat and/or pressure thereto to form a laminate; and **(3)** peeling the support from the laminate so that the organic layer is transferred onto the first substrate via the electrode. As distinguished features thereof, **(4)** the first substrate has a maximum surface roughness Rmax in the range of 0% to 50% obtained from

a ratio of a maximum surface roughness Rmax (nm) of the first substrate to the thickness (nm) of the organic layer, (5) the organic layer has a glass transition temperature of from 40°C to the transfer temperature + 40°C, and (6) after the transfer of the organic layer onto the first substrate via the first electrode, a second substrate having an electrode formed at least partially thereon is laminated to the organic layer on the first substrate.

Since the feature (1') above is substantially equivalent to the feature (1) in amended claim 1 mentioned above, Tutt fails to teach or suggest the processing feature (3) and the distinguishing property features (4) to (6) of the amended claim 13 of the present application for the same reasons as described with respect to amended claim 1 above.

Independent claim 19

Processing features of the amended independent claim 19 directed to an organic electroluminescent device are found in being produced by a method comprising the steps of (1") superposing a transfer material comprising at least one organic layer formed on a support on a plate having a pattern on a first substrate having a first electrode formed at least partially thereon such that the organic layer of the transfer material faces the electrode on the first substrate; (2) applying heat and/or pressure thereto to form a laminate; and (3) peeling the support from the laminate so that the organic layer is transferred onto the first substrate via the electrode, wherein, as distinguishing characteristics thereof, (4) the first substrate has a maximum surface roughness Rmax in the range of 0% to 50% obtained from a ratio of a maximum surface roughness Rmax (nm) of the first substrate to the thickness (nm) of the organic layer, (5) the organic layer has a glass transition temperature of from 40°C to the transfer temperature + 40°C, and (6) after the transfer of the organic layer onto the first substrate via the first electrode, a second substrate having an electrode formed at least partially thereon is laminated to the organic layer on the first substrate.

Since the feature (1") above is substantially equivalent to the feature (1) in the amended claim 19 mentioned above, Tutt fails to teach or suggest either the feature (3) or the distinguished features (4) to (6) of amended claim 13 of the present application for the same reasons as described in the amended claim 1 above.

Independent claims 1, 7, 13, and 19

For the reasons give above, a person of ordinary skill in the art referring to Tutt at the time the present invention was made would not be able to achieve the processing feature **(3)** nor the distinguishing characteristics **(4) to (6)** of the respective currently amended claims 1, 7, 13, and 19 herein. Accordingly, claims 1, 7, 13, and 19, and all claims dependent therefrom, are not obvious over Tutt. Detailed discussions of the ancillary references follow.

Nakaya

Nakaya discloses an organic EL device including a substrate (21), a hole infecting electrode (22), an electron injecting electrode (25), and organic layers (23, 24) disposed between the electrodes, where the hole injecting electrode (22) is an ITO electrode having (111) orientation, whereby due to improved film formation, close contact and physical properties at the interface between the hole injecting electrode and the organic layer, the device has a long lifetime, high luminance, high efficacy, and quality display and prevents the occurrence of current leakage and dark spots. However, Nakaya fails to teach or suggest not only the features **(1)** to **(3)** and the distinguishing characteristics **(4)** to **(6)** of the respective amended claims 1 and 7 but also the features **(1')** to **(3)** and the distinguishing characteristics **(4)** to **(6)** of the amended claim 13 as well as the features **(1")** to **(3)** and the distinguishing characteristics **(4)** to **(6)** of the amended claim 19 of the present application. Therefore, one of ordinary skill in the art referring to Nakaya at the time the present invention was made would not be able to achieve the respective features and distinguished features of the amended claims 1, 7, 13 and 19 as described above, and, accordingly, the amended claims 1, 7, 13 and 19 are not obvious over the combination of Nakaya with Tutt.

Tsai

Although Tsai teaches that the glass transition temperature (Tg) of TBADN is 126°C, which is within the range of 40-290°C (see page 243521-3, left-side column, lines 30-31 of Tsai), Tsai fails to teach or suggest the respective features and distinguishing characteristics of amended claims 1, 7, 13, and 19. Accordingly, amended claims 1, 7, 13 and 19 are not obvious over the combination of Nakaya with Tutt and Tsai.

Tutt, Nakaya, Tsai, and Miyazawa

As is clear from the forgoing, neither of Tutt and Nakaya teaches or suggests the respective features and distinguishing characteristics of amended claims 1, 7, 13 and 19 and their dependent claims. Accordingly, one of ordinary skill in the art referring to Tutt would never be motivated at the time the present invention was made to combine the teaching of Nakaya to reach the present invention as claimed in the amended 1, 7, 13, and 19, and the claims dependent thereupon, in the present application even though combined with Tsai. The Miyazawa reference does not remedy the deficiencies of the Tutt, Nakaya, and Tsai references.

Miyazawa

The Examiner contends in Item (a) in Paragraph 11, lines 1-5, on page 7 of the Office Action, that: "Regarding claims 2-3, 8-9, 14-15 and 20-21, Tutt teaches a second electrode cathode (Para. 0143) but does not teach a second sealing substrate, nor the surface roughness properties thereof. Miyazawa teaches a method of forming OLED including a sealing substrate (Element 148) formed on the cathode (Element 154, for example)." What Tutt actually teaches is an electrode cathode **70** formed over an electron-transport layer **68** by codepositing **20** nm silver and **200** nm magnesium by vacuum deposition in the emissive portion of an OLED **58** formed on a substrate **36**, which is coated in the region of interest with anode layer **60**. See Fig. 4 and paragraphs [0123] and [0143] of Tutt.

Also, Miyazawa discloses the structure of an organic EL display device **100** of an active drive type using TFTs as the active elements constituted from an active element unit **146**, an organic EL element **140**, a cathode **154**, and a sealing unit **147** sequentially deposited on a base, where the organic EL element **140** is a functional film comprising a luminescent layer, a hole transport layer, an electron transport layer, and the like and the sealing unit **147** comprises a sealing resin applied on the base **121** and a sealing substrate (sealing can) **148** bonded on the base **121**. See Fig. 2 and paragraphs [0074]-[0075] and [0079], lines 1-5, of Miyazawa. In this regard, Miyazawa further discloses that the sealing substrate **148** is composed of glass, metal, or the like and is bonded to the base **121** and to the sealing substrate **148** using a sealing adhesive and a desiccant is disposed at the inner side of the base **121** as well as a N_2-gas-charged layer **149** charged with N_2 gas is disposed between the base **121** and the sealing substrate **148**. See [0079], lines 8-14 and Fig. 2f of Miyazawa.

Thus, although Miyazawa teaches an organic EL display device comprising the sealing substrate **148** composed of glass, metal, or the like, the sealing substrate **148** is disposed on the cathode **154** via the N_2-gas-charged layer **149**, whose feature is different from the structure of the organic EL device of the present invention which forms a sealing or a protective layer on the uppermost surface of the organic electroluminescent device. See page 44, lines 2-4 and lines 12-14 of Applicant's specification. Moreover, Miyazawa fails to teach or suggest the distinguished feature **(6)** of the present invention such that after the transfer of the organic layer onto the first substrate via the first electrode, a second substrate having an electrode formed at least partially thereon is laminated to the organic layer on the first substrate.

Dependent claims 25 and 26

Claims 25 and 26 are patentable for all of the reasons discussed above. Also, amended claim 25 calls for: "The method of any one of claims 1, 7, 13 and 19, wherein said first substrate has a maximum surface roughness Rmax in the range of 0.0001% to 25% obtained from a ratio of a maximum surface roughness Rmax (nm) of said first substrate to the thickness (nm) of said organic layer." Amended claim 26 calls for: "The method of any one of claims 3, 9, 15 and 21, wherein said first substrate has a maximum surface roughness Rmax in the range of 0.0001% to 25% obtained from a ratio of a maximum surface roughness Rmax (nm) of said first substrate to the thickness (nm) of said organic layer." Thus, because claims 3, 9, 15 and 21 are dependent from the amended claims 1, 7, 13 and 19, respectively, the subject matter of amended claims 25 and 26 is not obvious over Tutt and Nakaya and Tsai and Miyazawa.

Regarding the features of claims 25 and 26, the Examiner states on page 7, lines 2-12, of the Office Action that:

> Tutt does not teach the first substrate has a maximum surface roughness Rmax of 0.00001-25%, based on the ratio of the surface roughness to the thickness of the organic layer. Nakaya teaches forming substrates with electrodes for OLED devices having a maximum surface roughness of the first substrates of, for example, 2 nm (Col. 13, Lines 45-46, for example). It would have been obvious to one of ordinary skill in the art at the time the present invention was made to produce the first substrate with a maximum surface roughness of 2 nm, for example, since the smooth substrate OLED devices have lower leakage currents and stable emission of light without the presence of dark spots (Nakaya Abstract; Col. 1, Lines 57-65; Col. 15, Lines 1-5, for example). Since Tutt teaches that organic layer is 20 nm thick (Para. 0136) and Nakaya teaches that the maximum surface roughness Rmax is 2 nm, the ratio is 15%.

However, Tutt merely describes a layer of 20 nm of 2-tert-butyl-9,10-bis(2-naphthyl)anthracene

(TBADN), which is vacuum deposited onto an absorption layer **16** of 30 nm of chromium vacuum-deposited onto a 125 micron polyimide donor substrate **14** with a mild texture of about 2 microns height, followed by a second layer of 0.25 nm of tetra-tert-butyl-perylene (TBP) for an donor element **10** (Example 1) adapted for use in making an OLED device. See paragraphs [0134]-[0136] and [0137]-[0143] of Tutt. Accordingly, Tutt does not teach or suggest the distinguished feature **(6)** of the present invention such that after the transfer of the organic layer onto the first substrate via the first electrode, a second substrate having an electrode formed at least partially thereon is laminated to the organic layer on the first substrate.

Also, Nakaya teaches in lines 42-48 of column 13 that: "On a substrate of Corning (7059) glass, an ITO transparent electrode (hole injecting electrode) was deposited by sputtering as in Experiment 1, which electrode was the same as Sample No. 1. The glass substrate had a surface roughness: Ra ≤ 0.68 nm and Rmax ≤ 2.0 nm. The ITO transparent electrode formed on the substrate had Ra ≤ 0.74 nm and Rmax. ≤ 5.6 nm." However, Nakaya does not teach or suggest, as mentioned above, a step such that a second substrate having an electrode formed at least partially thereon is laminated to the organic layer on the first substrate, after the transfer of the organic layer onto the first substrate via the first electrode as the distinguished feature **(6)** of the present invention. Furthermore, the Nakaya disclosure, such that the glass substrate on which an ITO transparent electrode is deposited has a maximum roughness Rmax ≤ 2.0 nm, does not teach the maximum roughness Rmax of the first substrate of the respective amended claims 3, 9, 15, and 21 of the present application, and such a defect of Tutt that fails to teach that the first substrate has a maximum roughness Rmax of 0.0001-25% is not remedied by the disclosure of Nakaya.

Accordingly, there is no basis for the Examiner's assertion to deposit a layer of 20 nm of 2-tert-butyl-9,10-bis(2-naphthyl)anthracene (TBADN) of Tutt onto a substrate of Corning (7059) glass having a surface roughness of Rmax ≤ 2.0 nm of Nakaya in place of an absorption layer **16** of 30 nm of chromium vacuum-deposited onto a 125 micron polyimide donor substrate **14** with a mild texture of about 2 microns height of Tutt. Thus, there is no proper basis for the Examiner to make a conclusion such that since Tutt teaches that an organic layer is 20 nm thick and Nakaya teaches that the maximum surface roughness Rmax is 2 nm, the ratio is 15%.

Dependent claims 3-6, 9-12, 15-18, and 19-24

Because amended claims 3-5 and claim 6, amended claims 9-11 and claim 12, amended claims 15-17 and claim 18, and amended claims 21-23 and 24 are directly or indirectly dependant from the amended claims 1, 7, 13, and 19, respectively, they are also not obvious over Tutt and Nakaya even though combined with Tsai and Miyazawa.

As noted above, Tutt teaches an electrode cathode **70** formed over an electron-transport layer **68** by codepositing **20** nm silver and **200** nm magnesium by vacuum deposition in the emissive portion of an OLED **58** formed on a substrate **36**, which is coated in the region of interest with anode layer **60**. Miyazawa discloses the structure of an organic EL display device **100** of an active drive type using TFTs as the active elements constituted from an active element unit **146**, an organic EL element **140**, a cathode **154**, and a sealing unit **147** sequentially deposited on a base, where the organic EL element **140** is a functional film comprising a luminescent layer, a hole transport layer, an electron transport layer, and the like and the sealing unit **147** comprises a sealing resin applied on the base **121** and a sealing substrate (sealing can) **148** bonded on the base **121**. Although Miyazawa teaches an organic EL display device comprising a sealing substrate **148**, the sealing substrate **148** is disposed on the cathode **154** via the N_2-gas-charged layer **149**. This differs significantly from the structure of the organic EL device of the present invention which forms a sealing or a protective layer on the uppermost surface of the organic electroluminescent device. Also, Miyazawa fails to teach or suggest the distinguishing feature **(6)** of the present invention such that after the transfer of the organic layer onto the first substrate via the first electrode, a second substrate having an electrode formed at least partially thereon is laminated to the organic layer on the first substrate.

Accordingly, one of ordinary skill in the art referring to Tutt, Nakaya, Tsai, and Miyazawa at the time the present invention was made would not be motivated to modify the teaching of Tutt and Nakaya in view of the teaching of Tsai and the teaching of Miyazawa for the purpose to achieve a surface of a second substrate, on which the second electrode is formed, having a maximum surface roughness Rmax in the range of 0% to 50% obtained from a ratio of a maximum surface roughness Rmax (nm) of the second substrate to the thickness (nm) of the organic layer. Thus, the dependent claims herein are manifestly not obvious over Tutt in view of Nakaya in view of Tsai and further in view of Miyazawa

Conclusion and contact information

Applicant respectfully submits that the present amendments and arguments serve to obviate all rejections of record. If there are any questions, the Examiner is invited to contact Richard Gallagher, Registration No. 28,781, at (703) 205-8008.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

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Respectfully submitted,

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